Teaching Fire Prevention

Suggestions for the integration of fire-prevention teaching into schools' curricula
This publication does not set out to deal with fire protection for schools, since this subject is dealt with in the following publications:

a Education Pamphlet No. 53 *Safety at School* by the Department of Education and Science (Her Majesty's Stationery Office, 1967)

b *Recommendations for Safety in Workshops of Schools and Colleges of Education* (BS 4163 1968) obtainable from the British Standards Institution, British Standards House, 2 Park Street, London W1A 2BS

c Building Bulletin No. 7—*Fire and the Design of Schools* (4th edn) Department of Education and Science, Curzon Street, London, W1Y 8AA

d 'Safety Precautions in Schools' series of various leaflets by the Scottish Education Department (Her Majesty's Stationery Office, 1970)
Teaching Fire Prevention

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Introduction

1 This is a handbook of suggestions for ways in which fire and fire prevention can be related to subjects normally included in the curriculum of general education for young people. Emphasis has been put on the practical aspects of fire prevention. Nevertheless a certain amount of theory has been included where it appears relevant and may assist an understanding of principles.

2 The handbook is designed for use by teachers and others who, from time to time, are called upon to give advice and help on fire prevention. Its use should be adapted according to the needs of particular groups of students.

3 The contents are arranged, by subjects, in the form of headings and sub-headings, to serve as reminders of the context in which particular considerations of fire prevention may be introduced. The passage on legislation is an exception to this plan. In most sections a separate column on each page gives sources for more detailed information. Further suggestions for reading matter may be obtained from the bibliography on pages 26 and 27. Suggestions for demonstrations and experiments are given at the end of the sections dealing with chemistry and physics. Fire and fire prevention can also be the subject of projects undertaken by those engaged in particular studies, notably those concerned with sociology and economics.

4 The Home Departments would like to thank all those people who have helped in the preparation of this handbook and would welcome any comments and suggestions from teachers who have had occasion to use the guide or part of it, so that consideration may be given to incorporating new ideas into future editions.
The integration of fire-prevention teaching into Chemistry
Theory of combustion
States of matter (solid, liquid, gaseous)
Density and specific gravity
Heat and temperature
Evolution of flammable vapours
Flash point; ignition temperature
The 'fire triangle'
The role of oxygen/air
Changes in a material during combustion
Explanation of the behaviour of flames

Combustible materials
Solids
Effect of size on combustibility
Evolution of flammable vapours
Fuels
Smouldering or glowing combustion of charcoal/sawdust
Dusts; dust explosions
Explosives; hazards and sensitiveness

Liquids
Flash point (NB the dangerous property of liquids with low flash points)
Fire point
Explosive hazards of vapour/air mixtures or mists (analogy with dusts)

Gases
Theory: Gas laws, e.g. Boyle's Law; Charles's Law
Flammability and flammability limits
Effect of density, e.g. movement of vapours heavier than air

Specific gravity and vapour density
Effect of water/foam on flammable liquids

Simple equations
C + O₂ → CO₂ — with liberation of heat (exothermic reaction)
C + CO₂ → 2CO — with absorption of heat (endothermic reaction)

Spontaneous heating and combustion
Oily rags
Bacterial action on hay

References
Manual of firemanship Part I, 75p,
Her Majesty's Stationery Office, 1963,
Code No. 34-300-11-63

Home Office filmstrip No. 8:
Understanding fire

Education Pamphlet No. 53
Safety at school
Her Majesty's Stationery Office, 1967,
Code No. SBN 11 270123 X

What is fire? Wallchart and booklet and filmstrip No. 1, £3.
Film: The nature of fire, colour, 19 minutes, £40, Fire Protection Association

Glossary of terms associated with fire
(BS 4422 Part I, 1969, and Part II, 1971)
British Standards Institution
Incomplete oxidation
Hazards of carbon monoxide

Extinguishing of fires
Methods
Cooling, smothering, starving
Types of extinguishing agents
Water
Foam
Dry powder
Vaporising liquids
Carbon dioxide, nitrogen

Safety and chemicals
Laboratory practice
Storage and handling
Special arrangements for particular chemicals, e.g. sodium, phosphorus, care in labelling
Oxidising agents
Mixtures
Flammable substances
Toxic hazards

Flame-retardant chemicals
How they work—their use in treating clothing, furniture, fabrics, timber
New materials and developments
NB In the following suggestions for practical teaching the term 'experiment' should be understood to include work at the bench by students and also demonstrations by the teacher. It is the teacher's responsibility to decide in each case which of the experiments are suitable to be undertaken by the students; but it must be borne in mind that certain of these experiments, if not properly conducted, may themselves become hazardous. It must also be made clear that there is a vast difference between the consequences of a laboratory experiment and those which may arise from an accident, e.g. a small spillage of petrol or similar incident; this should be coupled with a warning against attempting such experiments outside the laboratory.

Theory of combustion

States of matter
Compare at normal temperature the ease of ignition in descending order—gases, liquids, solids.
1 Experiment Apply (i) a spark, (ii) a flame to
(a) town gas
(b) paraffin (about 20 cm³ in a basin)
(c) wood splint

Density and specific gravity
Compare relative density in relation to fire hazard and fire extinction.
2 Experiment Oil on water
Water on carbon disulphide

Heat and temperature
Temperature is an indication of gain or loss of heat. Heat is a quantity—heat transfer from a high-temperature source for a short period of time or from a medium-temperature source for a longer time will raise the temperature of the absorbing material to the same extent.
3 Experiment Illustrate by heating water in a beaker
Compare thin and thick wire heated in the same flame.

'Flash point' ignition temperature
4 Experiment Flash point—heat 20 cm³ of paraffin in a hot-water bath, apply a flame at each 1°C rise in the temperature of the paraffin. At a certain temperature the vapour above the paraffin will ignite momentarily, this is the 'flash point'.
See further under 'Liquids'. 'Ignition temperature' is usually related to solids as 'fire point' is to liquids.

The fire 'triangle'
The three essential components for combustion:
5 Experiment Demonstrate removal of heat—cool with water spray
Demonstrate removal of air—cover with an inverted jar
Demonstrate removal of fuel—allow a small quantity of fuel to be consumed

The role of oxygen/air
6 Experiment (a) Burn a candle under an inverted jar over water. Note the consumption of oxygen in the air and the rise in the water level
(b) Repeat, using a small piece of phosphorus in a boat
7 Experiment Show effect of increasing the oxygen ratio: lower a red-hot iron wire into oxygen in a gas jar
8 Experiment Lower a smouldering wood splint into oxygen in a gas jar as above

Changes in a material during combustion
9 Experiment Show naphthalene burning in air and producing carbon

Explanation of the behaviour of flames
10 Experiment Using a bunsen-burner, show how controlling the air will give a yellow flame at a minimum temperature or a blue cone flame with increased air/oxygen and maximum heat
Compare oxy/acetylene flame and oxy/propane flame.

Evolution of heat
Spontaneous heating and combustion
11 Experiment (a) Put fresh-cut grass cuttings in an insulated biscuit tin; show the gradual rise in temperature on a thermometer inserted in the grass
(b) Speeded up spontaneous heating. A rag soaked in oil of turpentine (not white spirit) is lowered into oxygen in a gas jar. Compare linseed oil and unsaturated compounds of vegetable...
or animal origin. Indicate the need for safe disposal of oil- or paint-impregnated wiping rags.

**Solids**

**Solid combustibles**
Show the variation in ease of ignition.
12 *Experiment* Apply a flame to:
(a) bulk timber
(b) kindling
(c) shavings
Indicate that the increase in surface area relative to mass gives greater access for air/oxygen.

Compare finely divided materials.
13 *Experiment* Sprinkle over a flame a small quantity of:
(a) flour
(b) fine sawdust
(c) starch
(d) sugar (fine caster)
Explain the explosive properties of dusts in mixture with air. Pulverised fuel, coal and hazards in handling.

**Fuels**
Solid fuels, e.g. wood, coal: initial heating to produce vapour and gases.
14 *Experiment* (a) Heat wood shavings in a small test tube and ignite the vapours given off
(b) Heat a small piece of coal as above. The principle of the latter is used in making town gas.
‘Flash over’ occurring in a fire is a result of the gradual increase of the temperature until a point is reached where the vapours being produced by the fire flash throughout. Even non-combustible but oxidisable material, if sufficiently finely divided and having a maximum surface area, will burn.
15 *Experiment* Steel wool ignited by the flame from a match
See also *Experiment* 11 in Physics Section.

**Chemical reaction**
Indicate the hazards of oxidisable substances in contact with oxidising agents (oxygen-rich).
16 *Experiment* Take two pieces of paper 2 in. × 2 in. (51 mm × 51 mm) soak one piece in 1% sodium chlorate solution and allow to dry Ignite each in turn
Indicate the fire hazard of weed killers consisting of chlorate.
Indicate the fire hazard of materials having a high oxygen content, e.g. cellulose nitrate, celluloid.
17 *Experiment* Ignite a small strip of celluloid sheet. Compare gun cotton, collodion as near explosives

**Liquids**

**Incompressibility**
Indicate the value of liquids in hydraulic actuating and control systems. The hazard of flammable hydraulic fluids, leakages under pressure and ignition particularly where they form a control system for machinery working at high temperature.

**Flammable liquids**

**Flash point**
The lowest temperature at which a liquid gives off sufficient flammable vapour in air to produce a flash on the application of a small flame.
18 *Experiment* A flame held just above paraffin in an open dish will not immediately ignite it. A similar test with methylated spirit or petrol: immediate ignition occurs
Methylated spirit and petrol have flash points lower than normal ambient temperatures.
All flammable liquids at temperatures above flash point are hazardous at the flash point. Vapour is always present, ready to be ignited by a flame, spark or other source

**Fire point**
The lowest temperature at which a liquid gives off sufficient flammable vapour in air to produce sustained combustion after the removal of the ignition source.

**Self-ignition temperature**
The temperature at which a material (solid, liquid or gas) will self-ignite and sustain combustion in the absence of an external source of ignition. Generally used in relation to liquids.
19 *Experiment* Heat a horizontal metal plate to about 475°C and drop on to it a few cm³ of petrol (premium or regular grade); no ignition should occur. Additives (anti-knock) push up petrol ignition temperature by about 80°C, i.e. to 550°C
Repeat using paraffin and diesel oil (motor)
Both should ignite. The plate needs to be heated to over 490°C before petrol will ignite
Contrary to general belief, it is slightly easier to ignite diesel oil and paraffin on a hot plate than petrol because of the presence of additives in petrol, but all three will readily ignite on a hot surface above 550°C, e.g. the exhaust pipe or manifold of an internal combustion engine.

**Gases**
Distinguish between ‘permanent’ gases and vapours.
Theory—Boyle’s Law; Charles’s Law
Quote examples of flammable and non-flammable gases. Give examples of common use.
Explain flammability range; compare:
(a) petrol
(b) butane (liquefied petroleum gas)
(c) hydrogen
(d) methane
All above are ignitable by a flame or spark, minimum ignition energy of electric sparks in different gases.
20 Experiment Demonstrate with petrol and/or butane lighters
Explain that outside the flammability range it is not possible to ignite a mixture, e.g. ‘weak’ or ‘rich’ mixture in a petrol engine.
Explain the influence of the vapour density on fire hazard. Hydrogen, coal gas or North Sea gas, being lighter than air, rises unless restricted. Petrol vapour or butane gas, being heavier than air, accumulates at low level and is slow to disperse.
21 Experiment An inclined trough with a lighted candle at the base, cotton wool saturated with petrol at the top
Demonstrate similarly with ether
Note that the flame is almost invisible. Compare with that of petrol, so-called cold flame.

Simple equations
Use for the calculation of heat/energy/temperature.

Extinguishing of fires
Refer to triangle of fire:
(a) removal or cutting off fuel
(b) cooling: the use of water, water spray for maximum heat absorption, latent heat of water
(c) sealing off or reducing the access of air
Indicate the use of:
water, where non-mixable liquid is involved and has a specific gravity greater than 1, e.g. carbon disulphide
foam, where the liquid involved has a specific gravity less than 1, e.g. oils, petrol, other hydrocarbons
alcohol-resistant type foam for flammable liquids which mix with water
dry powder, covering or coating the burning material or inhibiting the chemical reactions of flames
carbon dioxide, vaporising liquids, e.g. bromochlorodifluoromethane (BCF) to dilute the vapour and reduce the vapour/air ratio and inhibit the chemical reactions of flames
All above demonstrated by suitable experiment.

Flame-retardant chemicals
The mechanism of a flame retardant may include:
(a) the initiation of chemical reaction to promote oxidation without flame or at lower temperatures
(b) formation of low-density skin which insulates the material from further heat
(c) raising the ignition point of the treated material
Commonly-used fire-retardant compounds include phosphates and organo-phosphorus compounds, boron compounds; also a standard solution for the treatment of domestic fabrics, namely borax 7 oz (198.5 g), boracic acid 3 oz (85.05 g), water 2 qt (2.27 lit).
22 Experiment Compare non-treated and treated fabrics: fire-retardant treatments may be incorporated as an after-treatment or during initial manufacture of the material as in certain plastics.
The integration of fire-prevention teaching into Physics
Heat
A form of energy
How generated (chemical reaction or conversion from other forms of energy, e.g. electricity, light, motion)
Radiation—inverse square law with regard to flammable materials placed too close to radiant heat
Conduction—fire spread via steel joists in brick walls, through metal doors to combustibles stored in close proximity
Convection—effect of heat on density of gases
Thermal insulation

Light
Photo-electric cells as smoke detectors

Electricity
Simple circuits: function of fuses, circuit breakers, earth wires
Differentiate between miniature circuit breaker (MCB) and earth leakage circuit breaker (ELCB) and, further, the difference between voltage and current-operated ELCB—the latter will detect incipient leakage which could develop into a fire hazard
Batteries: explosive potential of hydrogen from accumulators when mixed with air
Relays: an automatic fire-detection system makes a good example
Insulation: properties of air, plastics, rubber, china
Safety: use and misuse of electrical equipment; flammable atmospheres
Static electricity: use of non-static equipment in operating theatres; dispersal of static on machinery

Radioactivity
Alpha particles in smoke detectors

Properties of materials
Thermal expansion
Linear expansion of steelwork causing collapse of buildings
Bi-metal strips in heat detectors
Thermocouples
Volumetric expansion—quartzoid bulbs in sprinkler systems

References
Glossary of terms associated with fire (BS 4422 Part I, 1969, and Part II, 1971)
British Standards Institution

Short films and filmstrips, on basic electrical principles, and information sheets from 'Understanding Electricity' (Electricity Council sponsored educational information service). Catalogue from 'Understanding Electricity', Guild Sound and Vision, London Road, London SW19 3NR

Building Research Station film Fire Tests on Structural Concrete Beams, 18 minutes; 1967, available on loan from Film Librarian, Department of the Environment, Neville House, Page Street London SW1P 4LS, or from the Department's regional offices (please give fourteen days' notice)
Physics teaching – list of experiments

NB In the following suggestions for practical teaching the term ‘experiment’ should be understood to include work at the bench by students and also demonstrations by the teacher. It is the teacher’s responsibility to decide in each case which of the experiments are suitable to be undertaken by the students.

Heat
Indicate the conversion of energy, e.g.:
- electricity from chemical reaction (batteries)
- electricity from the relative motion of magnetic fields using water or wind power
- electricity conversion to heat
- light conversion to heat
- motion conversion to heat (friction)

Radiation
1 Experiment Gas flame ignites paper a short distance away
2 Experiment A gas flame heating a gas fireclay radiant producing greater radiation ignites paper at a greater distance
   Indicate radiation effect from a burning building.
3 Experiment Show how radiation from an electric fire ignites paper
   A parabolic reflector of a fire will beam heat
   Explain the inverse square law.
4 Experiment Show by use of thermopile, galvanometer and radiant-heat source that heat falling on a surface from a radiating source is inversely proportional to the square of the distance
5 Experiment Demonstrate sun’s rays focused by a burning glass, fishbowl, water carafe, concave vanity mirror
   Indicate fire hazards to furnishings in the home.

Conduction
6 Experiment Metal sheet with a burner underneath it, paper placed on the top will ignite
7 Experiment Steel rod about 18 in. (457 mm) long held horizontally, heated one end, watch the rise in temperature on a thermometer, at the other end. Metal gauze will conduct heat from an explosive gas, preventing ignition.
   Principle of Davy safety lamp and industrial flame arresters
   Indicate the conduction effect on steel beams in buildings on fire and the transmission of heat.
   Explain—expansion will push out external walls.
   Steel bulkheads in ships: fire and heat transmitted from hold to hold.

Convection
8 Experiment Heat coloured water in a glass vessel; analogy of variation in density; hot gases rise similarly
9 Experiment If a cylinder of asbestos cement is held vertically around and above a 60-watt electric lamp, a piece of paper or fabric placed over the top will eventually char
   Explain: hot gases of a fire in a building will rise up stairways and unprotected lift shafts.

Thermal insulation
Its use to reduce transmitted heat by cladding steel stanchions and beams.

Light
Demonstrate use of photo-electric cells for light beam obscuration. Smoke detectors.

Electricity
Demonstrate the load carrying capacity of wires. Use different sizes of conductor in circuit with a high-wattage lamp using a 12-volt battery.
   Compare current and heating effect in each case. Fuses—explain fusing factors and difference between short circuits and overloads.
10 Experiment Demonstrate fuse wires and current capacity
   Heating of a circuit wiring where over-fused
11 Experiment Steel wool across the terminals of a dry battery
12 Experiment The operation of a circuit breaker on overload
   Explain need for earthing, protection against shock and fire.
13 Experiment Demonstrate the danger of a switch in the neutral lead of a circuit instead of the live lead

Batteries
Batteries, lead/acid and nickel/iron: the danger of igniting the gases by a spark consequent upon the accidental dropping of a spanner or tool across the terminals during or after charging.
14 Experiment With the use of a eudiometer, demonstrate the electrolysis of water, the proportions of hydrogen and oxygen produced, perfect combination for reformation on ignition.
Introduction
More fire fatalities occur in the home than anywhere else and this section is therefore of importance to boys as well as girls. If the need for greater care could be instilled into everyone, much personal suffering and financial hardship could be reduced. Nearly 1000 people die every year as a result of fire. The old and the young are the main sufferers of death and injury from fire in the home. Danger from Fire, produced for the householder by the Central Office of Information at the request of the Home Departments, gives information about all the hazards commonly encountered in dwellings and the appropriate remedies. As this contains much detailed advice, a copy has been attached for ready reference.

Statistics
These show that the greatest number of fire fatalities and injuries occur in outbreaks which are associated with:

<table>
<thead>
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<th>Casualties in a recent year</th>
<th>Non-fatal</th>
<th>Fatal</th>
<th>Total</th>
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<td>Electric, paraffin and gas room heaters</td>
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<tr>
<td>Electric</td>
<td>178</td>
<td>68</td>
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<tr>
<td>Paraffin</td>
<td>332</td>
<td>35</td>
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<td>Gas</td>
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<td>Smoking materials</td>
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<td>Fire in grates</td>
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<tr>
<td>Electric and gas cookers</td>
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<td>Children with matches</td>
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<td>164</td>
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<td></td>
<td>1911</td>
<td>353</td>
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</tbody>
</table>

Considerations essential to home fire safety include

1 Room heating
Solid fuel fireplaces
Care in lighting, danger of using flammable liquids and combustible draught inducers
Use of fireguards/sparkguards
Cleaning of chimneys

Heaters
Electric, gas, paraffin, liquefied petroleum gas
Radiant and convector types
Portable and fixed types
Care in use and maintenance of foregoing (particularly oil heaters)
Use of guards—additional to those incorporated in appliances

Fuel
Safe storage and handling of kindling, paraffin, liquefied petroleum gas

2 Other domestic appliances
Care in use and maintenance of electric and gas cookers etc.
electric irons, blankets etc.
3 Electricity
Correct wiring and fuses for electrical installations/appliances.
Switching off or withdrawing plugs of appliances when not in use.
Lamp of correct wattage, relative to lampshades. Never plugging an appliance (i.e. kettle or heater) into light socket

4 Gas
Action in case of failure of supply: pilot jets
Flexible connections: to Gas Board’s requirements
Taps: safety type
Cookers: correct positioning

5 Flammable materials
Liquid fuels
Petrol—legal restrictions to be observed; care taken in handling; do not keep or use indoors
Paraffin
Liquefied petroleum gas safe keeping of and care in use

Adhesives: solvents storage in closed containers away from naked flames and sources of heat
Matches: keeping out of reach of young children
Storage: avoiding needless accumulations in roof spaces, cupboards (especially under stairs), garages, sheds
Aerosols: containing flammable substances (e.g. hair lacquers) safe disposal of containers
Cooking fat: self-ignition when accidentally overheated
Generally: importance of observing manufacturers’ instructions as to safe use

6 Clothing
Fashions in relation to fire safety: close-fitting garments (e.g. pyjamas) safer than loose, flowing garments (nightdresses) etc.
Flame-resistant fabrics: their availability and use for home dressmaking; correct laundering
Nightdresses: sales controlled by Regulations* requiring small (children’s) sizes to be made from flame-resistant materials; nightdresses for adults to be made of such materials, or to bear warning label
Fancy dress costume: do not use paper: care should be taken with sources of ignition when wearing ‘party’ dresses
Cleaning at home: use only non-flammable cleaning fluids; do not use petrol

7 Good purchasing
Choose safe equipment, e.g. designed to British Standard specifications and/or the recommendations of individual safety boards, e.g. British Electrical Approvals Board
Awareness of dangers of buying second-hand equipment, e.g. electrical or oil appliances
After-sales service—avoidance of improvised repairs

8 Smoking
Plentiful supply of large ashtrays. Never smoke in bed

References
Short films and filmstrips, on basic electrical principles, and information sheets from ‘Understanding Electricity’ (Electricity Council sponsored educational information service). Catalogue from ‘Understanding Electricity’, Guild Sound and Vision, London Road, London SW19 3NR


15
9 The fireworks code
The Home Office fireworks code which sets out the essential safety measures is reproduced in Appendix 5

10 Fire safety at night
Tidying up before retiring—placing of guards before open fires—heating appliances should be turned off—make sure all cigarettes are out; doors must be closed to protect means of escape and to confine any small fire to its place of origin. Include advice to switch off and withdraw plugs from sockets (but not pulled by flex) of all electrical equipment not in service

What to do in case of fire
A plan of action should be prepared so that every member of the family knows what to do.

- Bring everyone in the house to the ground floor from where they can leave the building safely
- See that the fire brigade is called at once: don’t just think that someone else has already done so
- It is essential to see that everybody is safe and that the fire brigade has been called before investigating the fire
- Do everything possible to reduce draughts which may fan the fire; close all doors and windows, even in rooms away from the fire

If cut off by fire
- Close the door of the room and any fanlight or other opening and block up any cracks with bedding etc.
- Go to the window and try to attract attention
- If the room fills with smoke, lean out of the window unless prevented by smoke and flame coming from a room below or nearby. If you cannot lean out of the window, lie close to the floor where the air is clearer until you hear the fire brigade
- If you have to escape before the fire brigade arrives, make a rope by knotting together sheets or similar materials and tie it to a bed or other heavy piece of furniture
- If you cannot make a rope and the situation becomes intolerable, drop cushions or bedding from the window to break your fall, get through the window feet first, lower yourself to the full extent of your arms and drop
- If possible, drop from a position above soft earth. If above the first floor, drop only as a last resort

If clothing catches fire
A person whose clothes are on fire should be laid on the floor and rolled in blankets, rugs or a thick coat. If your own clothing catches fire, roll on the floor to extinguish the flames
The integration of fire-prevention teaching into Current and Civic affairs
The problem of fire

*Fire statistics*: people killed and injured—property damaged—causes
How losses affect the individual and the family and the community
False alarms
Arson

References

UK fire and loss statistics, Joint Fire Research Organization

Fire facts and figures, leaflet, Fire Protection Association

The fire service

Organisation of fire service in the UK
Planning of fire service cover
Cost of fire service cover
How a fire brigade works locally
Fire prevention work of the fire brigade
History of the fire service
Vandalism

Legislation

Legislation to protect life and ensure means of escape in the event of a fire covers a very wide field. The following paragraphs give a brief summary of the principal Acts of Parliament concerned with this aspect of public safety. New buildings have to conform with the provisions regarding structural fire precautions in the Building Regulations 1972 (Statutory Instrument 1972, No. 317)* as subsequently amended. The Fire Precautions Act 1971 extends the power to make Building Regulations to include means of escape from fire. As far as existing buildings are concerned, the Factories Act 1961 and the Offices, Shops and Railway Premises Act 1963 include provisions as to means of escape from fire and related fire precautions. These two Acts are concerned mainly with the safety, health and welfare of workpeople but extend, so far as fire precautions are concerned, to members of the public visiting the premises concerned. As for other premises where people congregate or visit for the purposes of entertainment, residential care and so on, the Fire Precautions Act 1971 will similarly provide for adequate means of escape and other fire precautions. There are a number of other enactments which provide for means of escape and fire precautions in a variety of premises, but these enactments are limited in their scope and diverse in their operation, and will gradually be superseded by the Fire Precautions Act 1971 as it is applied to various classes of premises. Except for new dwellings, to which the Building Regulations apply, the ordinary dwelling-house is not affected by fire-precautions legislation. But the Fire Precautions Act 1971 makes provision for dwellings where the occupants may be at special risk, for example in high blocks of flats, and the Housing Acts include provisions as to means of escape from fire in houses in multiple occupation. Special industrial risks are covered by appropriate legislation, for example in mines and quarries, premises used for the manufacture and storage of explosives and so on.

*Building Standards (Scotland) (Consolidation) Regulations 1971*
The integration of fire-prevention teaching into Economics and History
| Effect of fire on the nation's economy | Cross-refer to the section on current and civic affairs |
| Comparison of fire losses in different countries | Fire facts and figures, leaflet, Fire Protection Association |
| Fire insurance | |
| The cost of fire-prevention measures | |
| Economic structure of the fire service | |
| Hospital and medical costs | |
| Problem of fires in rural areas | |
| Great fires in history and their influence on control of building design and town planning | Great Fire of London, leaflet and filmstrip, British Insurance Association |
| The history and development of fire-fighting techniques | Fire fighting appliances, Science Museum booklet |
| The history and development of fire prevention | Fire Protection Association wallchart, 300 years of Fire, and its Prevention 25p, incl. teaching notes |
| The history and development of fire insurance | Leaflet on fire insurance British Insurance Association Cross-refer to Appendix 4 |
The integration of fire-prevention teaching into Woodworking and Metalworking
General
Safe environment:
clean working area
disposal of waste
Electrical apparatus:
covered wiring and fusing
machine motors
maintenance

Woodworking
Hazards and precautions associated with:
wood shavings and dust
dust extractors
flammable adhesives, sealing compounds and
impregnating substances
cellulose polishes and paints
soiled polishing rags
heaters for glue pots

Metalworking
Hazards and precautions associated with:
waste swarf and dust
cutting oils, quenching oils
open forges
care in handling cylinders
maintenance of valves and tubing
care in use to see that no oil or grease is used on oxygen cylinders
valves and unions (see p. 6, Experiment 11[b])

References
'Planning guide to fire safety with electricity', Fire Protection Association Journal No. 80 insert, 10p, 1968
'Planning guide to treating flammable liquids with respect', Fire Protection Association Journal, No. 79 insert, 10p, 1968
'Planning guide to fire safety in cutting and welding', Fire Protection Association Bulletin No. 27, 10p, 1966
**Appendix 1**

**Teaching younger children about fire**

Some of the material included under subject headings in this booklet may be applied to the teaching of children below eleven years of age. Also, for younger age groups, environmental studies can be an effective way of arousing interest and could be based on such themes as the positions of fire stations and hydrants, or national and local newspaper reports of fires. The following items of material may prove helpful for this purpose:

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<td>Home Office wallchart <em>Fireman John</em></td>
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<td><em>Live safely with fire</em>, a programmed learning book</td>
<td>Longman Group Limited, 74 Grosvenor Street, London W1X 0AS or Fire Protection Association, 40p, 1969</td>
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<td><em>Donald's fire survival plan</em></td>
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<tr>
<td><em>Fire</em>, illustrated colouring booklet</td>
<td>Central Fire Liaison Panel</td>
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*Donald's fire survival plan* is a Walt Disney film—on fire prevention in the home.

(Hiring charge: £2.50 per day)
## Appendix 2

### Where to get fire-prevention teaching material

<table>
<thead>
<tr>
<th></th>
<th>Films</th>
<th>Statistics</th>
<th>Photos</th>
<th>Filmstrips</th>
<th>Wallcharts</th>
<th>Posters</th>
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Appendix 3

List of filmstrips

Filmstrips produced by the Home Departments
1 Fire precautions in the home
2 Safe at night
3 In the event of fire
4 (a) Fire safety for children
   (b) Fire safety for the elderly
5 Fire in the home—what to do while awaiting the arrival of the fire brigade
6 Do-it-yourself with safety
7 (a) Fire precautions in pleasure craft
   (b) Fire precautions for campers
8 Understanding fire

Filmstrips produced by the Fire Protection Association
9 Fatalities in fires in dwellings

Filmstrip produced by the Institution of Fire Engineers
Fire precautions in hospitals

Appendix 4

Some historic fires and interesting dates

1666 First Great Fire of London
1667 Dr Nicolas Barban, the first insurance broker, created the Fire Office
1668 Act requiring local authorities to provide equipment for fire fighting
1690s Fire insurance wall plaques came into use
1707 First Fire Prevention Act
1731 Blandford Forum (Dorset) Fire
1774 Fire Prevention (Metropolis) Act
1824 The Great Fire of Edinburgh
1834 Burning of the Houses of Parliament
1836 Society for the Protection of Life from Fire formed
1838 Royal Exchange Fire
1841 Tower of London Fire
1861 Tooley Street Fire
1865 London Fire Brigade created
1866 First Merryweather steam engine
1875 Public Health Act includes regulations to assist fire fighting—establishment of fire brigades compulsory
1918 Institution of Fire Engineers created
1936 Crystal Palace Fire
1938 Fire Brigades Act
1940 The Second Great Fire of London (Blitz)
1941 National Fire Service College created
1947 Fire Services Act—returning brigades to local authority control
1970 French dance-hall disaster (over 140 young people died)
1971 Fire Precautions Act

Appendix 5

The fireworks code

The Home Office fireworks code sets out the following essential safety measures:
1 Keep fireworks in a closed box; take them out one at a time and put the lid back at once
2 Follow the instructions on each firework carefully; read them by torchlight—never by a naked flame
3 Light fireworks at arm’s length—preferably
4 Stand well back
5 Never return to a firework once lit—it may go off in your face
6 Never throw fireworks
7 Never put fireworks in your pocket
8 Keep pets indoors
9 Never fool with fireworks. It is a legal offence to throw or discharge a firework in a street or public place
Selected bibliography

Physics

*Automatic fire detection and alarm systems*, Fire Protection Association Booklet No. 41, 5p, 1964

'Training guide to fire safety with electricity', *Fire Protection Association Journal* insert No. 80, 10p, 1968

*Fire Technology—Electricity*, Institution of Fire Engineers publication, 50p, 1968


Chemistry


*Chemical fires and chemicals at fires*, Institution of Fire Engineers, 1968

Current and civic affairs

*Fire Alarm*, by Barton Clarke, Epworth Press, 42½p, 1954


*Annual abstract of Statistics* (including a bibliography of further statistical sources), Her Majesty's Stationery Office, £1.85, 1969

*Report of the Departmental Committee on the Fire Service* (Holroyd), Her Majesty's Stationery Office, £1.00, 1970

*The Registrar General's statistical reviews of England and Wales* (published annually), *Part I: Medical tables*, Her Majesty's Stationery Office, £2.12½

*Fire facts and figures*, a leaflet published annually by Fire Protection Association, single copies free, if ordering more, 4p each

Economics

*Fire Underwriting in Theory and Practice*, by George Hurren, Buckley Press Limited, 91½p, 1952


'The fire scene abroad' *Fire Protection Association Journal* No. 84, pp. 368–73, 40p, 1969

United Kingdom fire and loss statistics, published annually by Her Majesty's Stationery Office, and prepared by the Department of the Environment and Fire Offices' Committee Joint Fire Research Organization, £1.30

*Annual Report of Her Majesty's Chief Inspector of Fire Services*, Her Majesty's Stationery Office, 22½p

*Annual Report of Her Majesty's Inspector of Fire Services for Scotland*, Her Majesty's Stationery Office, 22½p

Woodworking and metalworking

*Planning fire safety in industry*, Fire Protection Association technical booklet No. 40, 20p, 1964

*Fires in metal working industries*, Fire Protection Association technical information folder F7, 10p, 1964


History


*Fire engines and other fire-fighting appliances*, by K R Gilbert, Science Museum, Her Majesty's Stationery Office, 35p, 1966


*300 years of fire and its prevention—wallchart and teaching notes*, published by Fire Protection Association, 25p, 1966

The Great Fire of London

*The rebuilding of London after the Great Fire*, by T F Reddaway, Edward Arnold, £1.75, 1951


Facsimile of *The London Gazette* of 3 September 1666, reporting the Great Fire (reproduced in old script), Her Majesty's Stationery Office, 7½p, 1966

Two adventure books about the Great Fire of London
The Great Fire, by J Hope Simpson, Hamish Hamilton, 60p, 1961
The Plague and the Fire of London, by S Ross, Faber and Faber, 62½p, 1965

Fire insurance
A history of British insurance, by H E Raynes, Sir Isaac Pitman, £2.75, 1964
Teach yourself insurance, Chapter 4, by H A L Cockerell. For reference and older students, English University Press, 45p, 1970

Fire fighting
Fire alarm, by Barton Clarke, Epworth Press, 42½p, 1954

Statistics
Reference to sources of information on firebrigade statistics and the cost of providing a public fire service in the United Kingdom
Report of Her Majesty’s Chief Inspector of Fire Services (Counties and County Boroughs, England and Wales), House of Commons Command Paper, published annually, Her Majesty’s Stationery Office, 22½p
The fire services in Britain, Central Office of Information, Her Majesty’s Stationery Office, free, 1967
Fire services statistics, Institute of Municipal Treasurers and Accountants (Incorporated) and Society of County Treasurers, published annually, 50p
Fire Services Acts 1947, 25p; 1951, 4p; 1959, 9p, Her Majesty’s Stationery Office

General
Fire investigation, by Paul L Kirk, John Wiley and Sons, Inc, £4.20, 1961
Classification of fire hazards and extinction methods, by J D Birchall, Benn Bros, 90p, 1961
Dictionary of fire technology, Institution of Fire Engineers, 1962
Facts and figures for firemen, Institution of Fire Engineers, 1964
What is fire? by Susan Hicklin, Fire Protection Association, 15p, 1965
Building construction for firemen, Institution of Fire Engineers, 75p, 1968
Live safely with fire, by Dr John Leedham
This is a programmed learning booklet commissioned by the Fire Protection Association and published by Longmans Group Limited, 40p, 1969
General fire hazards and fire prevention, by J J Williamson, Sir Isaac Pitman, £1.75 (paper), 1971
Guide to Fire Precautions Act 1971, No. 1 Hotels and Boarding Houses, Her Majesty’s Stationery Office, 20p

Note: Some of the older books may now be out of print, but public libraries and larger bookshops may be able to supply them. Readers are advised to confirm prices before ordering.
Her Majesty’s Stationery Office publications may be obtained from the undermentioned government bookshops or through any bookseller:
London WC1 V 6HB: 49 High Holborn
Edinburgh EH2 3AR: 13a Castle Street
Cardiff CF1 1 JW: 109 St Mary Street
Belfast BT1 4JY: 109 St Mary Street
Manchester M60 8AS: Brazennose Street
Birmingham B1 2 HE: 258 Broad Street
Bristol BS1 3 DE: 50 Fairfax Street